Bio-optical Algorithms for European Seas: Performance and Applicability of Neural-Net Inversion Schemes

Davide D'Alimonte, Tamito Kajiyama, Carolina Sá, Giuseppe Zibordi, Jean-François Berthon, and Elisabetta Canuti
Outline

• Radiative transfer modeling
  – MOX

• OCPortugal
  – Regional MLP

• WESTOC
  – How to use
  – A case study
MOX

• New MOX functionalities under development
  – 3D simulations
  – Accurate sky-radiance modeling
OCPortugal is a coordinated set of actions undertaken by different ocean color research groups of Portugal.
Regional MLPs Atlantic off Portugal

Source: MER_RR__2PRACR20100825_103551_000026292092_00223_44365_0000.N1 (3rd reproc.)
Regional MLPs Atlantic off Portugal

For MODIS images with match-up stations within 1km and 6h, Rrs at 488, 530, 555nm and Chla OC3m product were extracted.

Analysis restricted to the [0.2,2] mg m$^{-3}$ total chlorophyll concentration range
The WEb Support To Ocean Color WESTOC is an interface to MLP bio-optical algorithms: http://westoc.di.fct.unl.pt/interface/

Case studies:
- MLP performance with respect to independent data;
- accuracy of data products for different $R_{RS}$ center-bands; and
- assessment of band-shift for correcting difference between in-situ and space-born center-bands.
In each figure, Panel (a) identifies ROI boundaries. Panel (b) shows regions of validity of both algal-1 and algal-2. Green (red) pixels indicate where both algal-1 and algal-2 are valid (invalid). Yellow pixels highlight where only algal-2 is valid. Panels (c) and (d) show MLP$^{alg1}_{(basin)}$ and MLP$^{alg2}_{(basin)}$ products, respectively, regardless of the validity flags. Panels (e) and (f) display MER$^{alg1}$ and MER$^{alg2}$ maps, respectively. Panel (g) shows a scatter plot of MER$^{alg1}$ versus MLP$^{alg1}_{(basin)}$ values for the valid pixels of ROIs highlighted in Panel (a). Comparison results are evaluated through the scattering and the bias expressed in terms of absolute $\epsilon$ and signed $\delta$ unbiased percent differences, respectively:

$$\epsilon = \frac{200}{N} \sum_{i=1}^{N} \left( \frac{\text{MER}^{alg1}}{\text{MLP}^{alg1}_{(basin)}} - 1 \right)$$

$$\delta = \frac{200}{N} \sum_{i=1}^{N} \left( \frac{\text{MER}^{alg1}}{\text{MLP}^{alg1}_{(basin)}} - 1 \right) \times 100$$

where $N$ is the total number of samples, and $i$ is the sample index. Panel (b) is the same as Panel (g), but for algal-2.
Acknowledgments

• European Space Agency through contract number C22576.

• Geo-Info project funded by the Portuguese Foundation for Science and Technology (FCT), Ministry of Science, Technology and Higher Education

• Instituto Hidrográfico (João Vitorino)
Related publications 2011-2012


• Mélin, F.; Vantrepotte, V.; Clerici, M.; D'Alimonte, D.; Zibordi, G.; Berthon, J. F. & Canuti, E. Multi-sensor satellite time series of optical properties and chlorophyll-a concentration in the Adriatic Sea Progress in Oceanography, 2011, 91, 229-244